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E. Dean Baldwin, Thomas R. Smith,
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North Central Regional Research Bulletin 325
Southern Cooperative Series Bulletin 350
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Agricultural Experiment Station
College of Agriculture
University of Illinois at Urbana-Champaign

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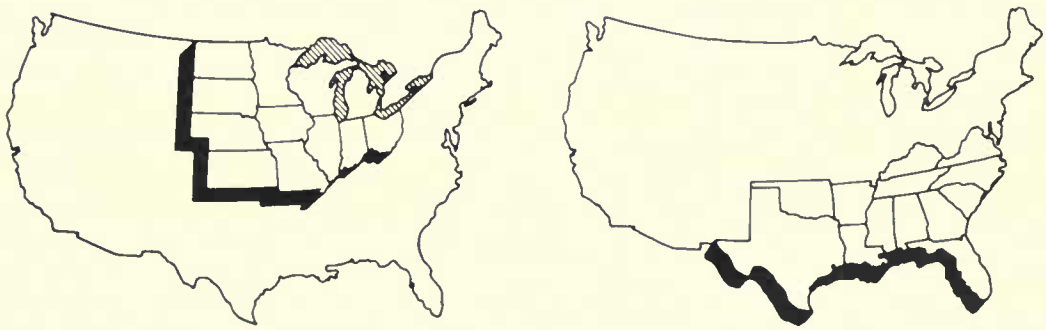

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September, 1990

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This bulletin is one in a series of North Central and Southern Cooperative bulletins. It represents a contribution to North Central Project NC-137, "Effect of Changes in Transportation on Performance of the U.S. Agricultural Transportation System," and to Southern Regional Project S-176, "Interregional Marketing Systems for Grains and Soybeans." The Illinois Agricultural Experiment Station is the publishing station. Requests for copies of this bulletin may be sent to Office of Agricultural Communications and Education, 67 Mumford Hall, 1301 West Gregory Drive, University of Illinois, Urbana, Illinois 61801.

Abstract

Information about the origin, destination, and mode of transport in marketing grain is often useful in making policy and investment decisions related to grain. The data and analyses presented in this publication were developed to aid in making these policy and investment decisions. This bulletin contains the results of a nationwide study to obtain the volumes of oats moved by truck, rail, and water among destinations in 42 states during 1985. The study was designed to update a similar survey conducted in 1977. This bulletin contains a description of the findings of the 1985 survey and an analysis of the changes that have occurred between the 1977 survey and 1985.

Preface

This bulletin contains the results of nationwide research to obtain the volumes of oats moved between U.S. origins and destinations using various transport modes in 1985. Other publications in this series provide similar information for corn, soybeans, wheat, and sorghum. It updates a similar survey conducted in 1977.

During 1986, members of two university research committees located in 21 states conducted surveys to gather data about the origin and destination of wheat, corn, soybeans, sorghum, and oats in each of their states. In another 12 states, private consultants or university faculty at land grant institutions in the states administered the survey under contracts. Finally, data about grain and soybean movement in an additional nine states were gathered using a combination of secondary data, neighboring state surveys, and interviews with managers of major firms and state agricultural officials. The resulting database contained information from 42 states for the year 1985.

The industry surveys were coordinated in the Department of Agricultural Economics at the University of Illinois at Champaign-Urbana. The data were summarized, verified, and reconciled under the supervision of Joseph E. Vercimak, University of Illinois, and Dr. Dean Baldwin, Ohio State University. The success of this research project is due to the cooperation of thousands of grain marketing firms and the efforts of researchers around the United States.

The research was partially funded by the Federal Railroad Administration under contract No. DTFR 53-84-C-00036, the Agricultural Marketing Service, USDA; the Agricultural Cooperative Service, USDA; the Illinois Department of Agriculture and the Soo Line Railroad. Administration of the grant funds was coordinated by Joseph E. Vercimak. The research is a contribution to regional research projects S-176, "Effect of Changes in Marketing Systems for Grains and Soybeans" and NC-137, "Effect of Changes in Transportation on Performance of the U.S. Agricultural Transportation System."

Acknowledgements

The authors wish to acknowledge the leadership of Joseph Vercimak of the University of Illinois in managing the collection and processing of the 1985 grain flow information. The authors also wish to thank Karlene Robison and Pamela Brown for word processing assistance and Janice DeCarolis for assistance in chart preparation. This research was carried out with the cooperation of the Southern Regional Grain Marketing Committee and the North Central Regional Transportation Committee. The authors thank the review committee of Linwood Hoffman, Carl Toensmeyer, and Eric Wailes for their helpful comments.

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Purpose of the Study

Introduction

Oats are a minor feed grain consumed primarily on the farms where they are produced. Oats are a good source of protein, fiber, and minerals, but contain fewer calories than an equivalent quantity of corn. Oats are fed to dairy cattle, horses, mules, replacement layers and turkeys. They are a preferred feed for horses and "breeder show animals" that must be maintained in excellent condition for extended periods of time. In addition, smaller quantities are fed to slaughter animals such as hogs, beef cattle and lambs. However, during the last half of this century, the amount fed to livestock has tended to decrease [Hoffman and Livezey, 1987].

On the other hand, there has been a continuing small but steady demand for oats as a domestic food. The amount of oats used for food may increase in the future because some oat products are now perceived to be health foods: oat bran may lower cholesterol levels; oat fiber may decrease the risk for certain types of cancer; and oat bran muffins may be a nutritious substitute for other bakery products such as donuts.

For several reasons, the volume of oats produced in the United States may increase in the future. (1) It may be advantageous for farmers who wish to diversify their operations to add oats to their rotations because the volume of oats exported from the United States is relatively small and variable compared to soybeans, corn and wheat. In fact, during the 1980s the United States became a net importer of oats. (2) Enthusiasm for organic or alternative farming practices may lead to more production. (3) Oats may be used for pasture or forage conservation, or as a companion crop for the creation of legumes and grasses.

Because oats are shipped from producers to domestic users and export ports, and/or from importers to final domestic users, they compete with other feed, food and oilseed grains for storage and transportation services. Thus, information about the shipping patterns of oats such as that contained in this bulletin will enable oats industry participants to improve market performance through better decision-making that will contribute to a more efficient flow of oats. Such information may also improve the decisions about investments in port facilities, rail, truck and barge services, elevator and processor facilities, and farm production.

Although data on the quantities of oats shipped from each port and the amount of oats shipped on inland waterways are available, little information has been available to match origins with destinations and to identify the mode of transportation. The first comprehensive national study of grain movements was completed for the 1977 calendar year [Leath Hill and Fuller]. This bulletin updates the earlier study by reporting oats shipping and receiving patterns for 1985.

Objectives of the Study

The main objectives of this paper were to:

(1) identify the quantity of oats shipped among various state, regional and export/import locations,

(2) determine the extent to which various transportation modes are employed in the movement of oats in the United States,

(3) compare 1977 and 1985 patterns of shipments and modes of transport.

Methodology

Grain flow data were collected primarily through personal interviews with representatives of grain handling, storage, and processing firms. The firms from which data were obtained included country elevators, subterminal elevators, terminal elevators, feed manufacturers, export elevators, commercial feedlots, poultry operations, processors and millers.

Representatives in each of the states surveyed were responsible for drawing a statewide sample and conducting the interviews for each of above firms or plants. It was intended that all major producing and consuming states be included in the survey. This was accomplished by coordination of two regional grain marketing and transportation committees at land-grant institutions and contracting with those grain producing states that were not represented on the regional committees. This procedure provided data from 33 states. An additional nine states, considered to be significant grain producers, were added using secondary data supplemented with alternative sampling and interview procedures.

Sampling Method

A stratified sampling technique was used where the number of firms was too large for complete enumeration with the available resources. Data were expanded by using multipliers to yield estimates of totals for each state. The sampling of inland grain elevators in each state was carried out by listing elevators in descending order of storage capacity. Then, starting with the largest storage capacity, successively smaller plants or firms were added to the sample until the total capacity equaled 25 percent of the elevator storage in the state. Random sampling of smaller firms was conducted at the rate of not less than 10 percent of all firms in each category. States with a large number of firms used additional stratification and some states sampled by plant rather than by firm. The questionnaire allowed sampling by plant or by firm, provided that elevator capacity was adequately represented in the sample and the samples could be expanded to represent total grain transported. Some states used a complete enumeration of all firms.

River elevators were sampled at a rate of not less than 50 percent. Feed firms were surveyed from the largest downward until 10 percent of the total capacity was surveyed. A random sample was taken from the remaining firms. Integrated firms such as feedlots and poultry operations were sampled at the rate of not less than 50 percent. For processing firms, the sampling rate was usually 100 percent since the number of firms in each state was relatively small.

Not all firms in the sample provided usable data. Various reasons were given by elevators and processors who refused to divulge volume data by origin and destination but the data provided for 1985 was less complete than that of 1977 due to lack of cooperation from some major processors and grain handlers. Whenever possible, a random replacement of similar size and geographic location was chosen for small firms in the sample that did not provide usable data. For some of the larger elevators and processors, volumes and flows were estimated from secondary sources or by the interviewer on the basis of prior knowledge. These estimates were validated by the grain marketing specialist in each state based on their knowledge of grain movements and price relationships.

Procedure

Each of the grain handlers and processors interviewed provided the same type of information. Each firm was asked to identify the volume, origin, and mode of transport for all grain received. The firms were also asked to identify the volume, destination and mode of transport for grain shipped from their facilities. Data were coded using a consistent format and sent to the University of Illinois for processing. Processing involved the verification of data and summarization of state totals that would be used in reconciling flows. The reconciliation, coordinated at Ohio State University, required matching the estimates of quantities transported between each origin and destination as reported by the shipping state with the estimates reported by the receiving state. Responsibility for integrating these data and generating the data tables for

the grains was distributed among four universities: corn at the University of Minnesota, soybeans and oats at Ohio State University, wheat at the University of Kentucky and sorghum at the University of Illinois at Urbana-Champaign.

After the survey data were compiled and tabulated, representatives from the major receiving and shipping states met to reconcile differences among the three sources of volume information: (1) the survey data from the receiving state; (2) the survey data from the shipping state; and (3) secondary data including the Waybill sample from the Federal Railway Administration and the complete enumeration of all barge movements recorded on the data tapes by the U.S. Army Corps of Engineers (COE).

The variable sampling rate for some types of shipments included in the Waybill sample gives rise to potential errors when the data are summarized on a state or sub-state basis. Barge shipments and receipts from the COE data tapes are quite accurate as to total volume but cannot always identify ultimate origins and destinations when barges are transhipped or destinations changed in transit. Truck data were available only from the survey. Shipments from farms to elevators were identified only through records of elevator receipts. Truck shipments across state lines were especially difficult to verify since neither truckers nor farmers were included in the survey.

Another important secondary data source in final verification of movements into or out of each state was an estimate of "exportable surplus" for each state. A grain marketing specialist from each state university in the regional committee calculated the surplus or deficit in their states based on production, an estimate of grain consumed by livestock, seed and processing use, and inventory change for calendar year 1985. The residual was accepted as an estimate of the remaining surplus available for export or the deficit to be filled by imports from other states. Because much of this information, especially consumption by livestock, was based on estimates, the numbers were not expected to match exactly with reconciled flows. However, these data provided additional information from which to judge the reasonableness of receipts and shipment data from the various sources. Estimates of production-utilization for the 1981-1983 period and by state are available in North Central Regional Bulletin No. 317 and Southern Regional Bulletin 333 [Wailes and Vercimak]. Production and utilization data were assembled and analyzed for 1985 but are not published in this manuscript.

Comparisons of the data obtained from various data sources increased the confidence in the accuracy of estimates obtained from sampling a less-than- complete population. Although the logic and consistency of each flow summarized in this report has been checked by the representative that organized and conducted the survey in each state, both inter-state and some intra-state truck shipments may have been under-reported. Oat truck shipments by dealers, trucking merchants, and some specialty food firms were not gathered because the firms were not part of the population sampled for the survey. Further, some state representatives were unable to collect complete oat shipment data because firms that were part of the population had incomplete records. These potential omissions are more significant for oats than the other grains and oilseed because relatively large quantities of oats may be moved by truck to local feeders after cleaning or minor processing operations.

Production and Utilization

Oats are produced throughout much of the United States. While yields per harvested acre increased during the period from 1955 to 1985, total production decreased 67 percent,

from a high of 1.5 billion bushels in 1955 to 520.8 million bushels in 1985 (Table 1). The reason for the decrease was a downward trend in the number of harvested acres, from 45 million acres in 1950 to 15 million in 1985 (Figure 1). Most of the acres taken out of oats production were either used for corn, wheat and soybeans or were transformed into idle land in the government farm program [Hoffman and Livezey, 1987].

Figure 2 contains a map illustrating the states comprising each of the ten producing regions referred to in this study. In 1985, 81.5 percent of all oats were produced in the Northern Plains, Lake States and Corn Belt regions (Table 2). Much smaller amounts were produced in the Northeast, Pacific and Mountain regions. During the early 1980s, five states harvested 63 percent of the U.S. oats crops. These states, listed in order of volume produced, were South Dakota, Minnesota, Iowa, Wisconsin and North Dakota [Hoffman and Livezey, 1987].

With few exceptions, oat stocks averaged around 200 million bushels each year during the 1955 to 1985 period (Table 1). Imports were small, ranging from one to two million bushels for most years. In both 1955 and 1985, the United States was a net importer. The total supply of oats decreased from 1.8 billion bushels in 1955 to less than 729 million bushels by 1985.

During the period from 1955 to 1985, the volume of oats used for feed declined by nearly 64 percent while use for seed declined by 67 percent. In contrast, the volume of oats used for food increased by 10 million bushels during the period, a 30 percent increase. Exports peaked in 1959 at 46 million bushels, declining thereafter to a low of 1.3 million bushels in 1984, a 97 percent decrease [Agricultural Statistics, 1960, 1970, 1980, and 1987]. Total disappearance declined annually for much of the period (Table 1 and Figure 3).

Since much of the oat supply is fed to livestock or used as seed, oats are most often consumed on the farms where grown. In the 1950s, only 25 percent of the oats crop was marketed beyond the farm gate, compared to 35 to 40 percent in 1985. This upward trend in off-farm sales reflects both a decrease in use for feed and seed on the farms where they were grown, and an increase in demand for oat products as food. Because of this trend, more oats were shipped from surplus regions to deficit consuming centers in 1985.

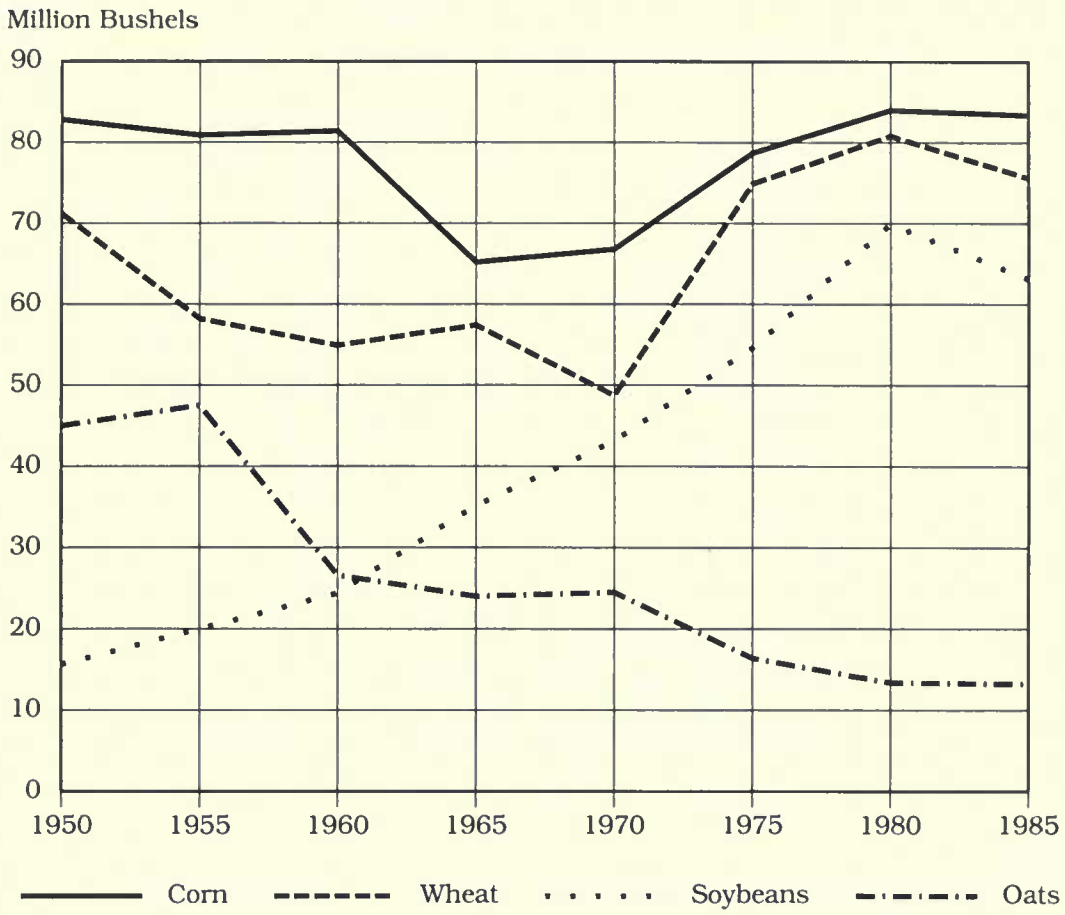
Analysis of Shipments and Receipts

Intrastate Movements

The volume of intrastate shipments of oats was 41.0 percent of total production in 1985 (Table 3), only slightly above the 35 to 40 percent range for off-farm sales of oats reported in secondary sources [Hoffman and Livezey, 1987]. The states with the largest intrastate shipments were South Dakota, Iowa, Nebraska, North Dakota, Minnesota, Michigan, Ohio, Pennsylvania, and New York. Although those states with the largest intrastate shipments were also the largest producers of oats, the rankings among states must be examined with caution since some states may have under- reported truck shipments.

Truck shipments accounted for more than 92 percent of all intrastate shipments; rail accounted for less than 6 percent; and barge accounted for 2 percent. Barge movements, reported only for Louisiana, represented imports into the Gulf that may have been enroute to end users in the Corn Belt, Northeast, and Southern regions with only intermediate stops within the state. Part of the reason is that short distance shipments by barge or rail are generally not economical.

Figure 1.
Acres Planted to Oats, Corn, Wheat, and Soybeans, 1950-1985.



Source: *Agricultural Statistics*, U.S.D.A., Selected Years

Table 1.
Oats Supply and Disappearance in the United States for Selected Years from 1955 to 1985.

	Supply				Disappearance			
Marketing Year[a]	Beginning Stocks	Imports	Production	Total	Feed and Residual	Food and Seed	Exports	Total
				millions of bushels				
1955	303	3	1,503.1	1,809.1	1,278	146	30	1,454
1960	267	1	1,050.0	1,318.0	943	127	27	1,097
1970	548	1	915.7	1,464.7	768	106	16	890
1975	224	1	639.0	864.0	559	86	14	659
1977	164	2	752.7	918.7	509	85	12	606
1980	236	1	458.8	695.8	432	74	13	519
1985	180	28	520.8	728.8	460	83	2	545

[a] Beginning June or July 1.

Source: *Agricultural Statistics*, U.S.D.A. (Selected Years).

Table 2.
Oats Production by Regions of United States for 1985.

Region	Oats Production	Percent of U.S. Production
	millions of bushels	
Northeast	43.3	8.3
Lake States	154.6	29.8
Cornbelt	110.0	21.2
Northern Plains	158.0	30.5
Southern Plains	17.8	3.4
Appalachia	4.0	1.0
Southeast	5.0	1.0
Delta	1.1	[a]
Mountain	10.3	2.0
Pacific	14.3	2.8
Total[b]	518.6	100.0

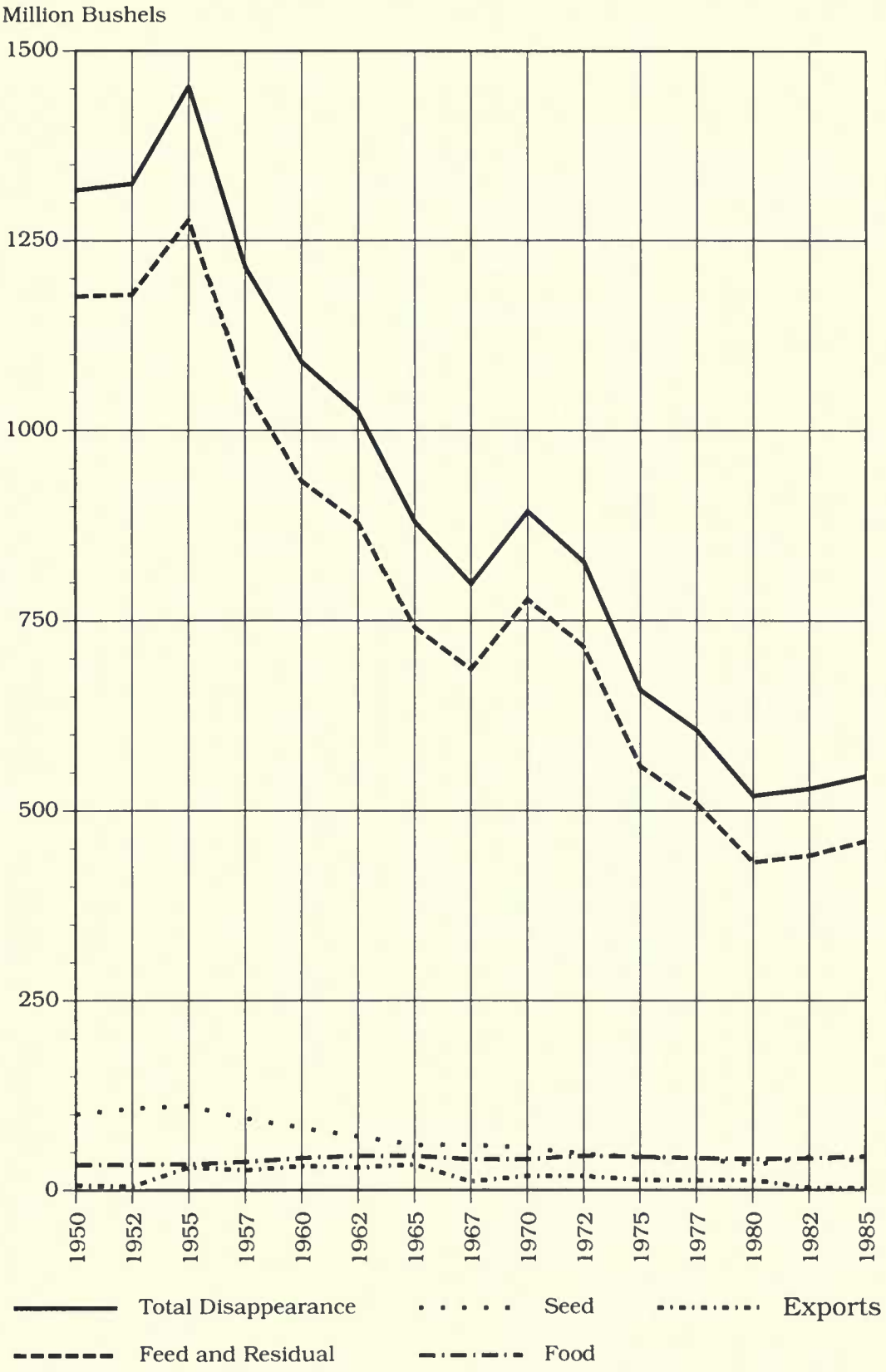
[a] Less than one percent.

[b] Total may not sum due to rounding.

Source: *Agricultural Statistics*, U.S.D.A., 1986 and 1979.

Figure 2.
Regions Used for the Projections of Oats Production and Shipping Patterns.

Figure 3.
Oats Usage in the United States, 1950-1985.



Source: *Agricultural Statistics*, U.S.D.A., Selected Years

Table 3.

1985 Intrastate Shipments of Oats for Each State and Mode of Transport.[a]

Origin State	Mode			Total	Production
	Truck[b]	Rail	Barge		
	thousands of bushels				
Alabama	266	168	0	434	1,435
Arizona	826	0	0	826	0
Arkansas	2,684	0	0	2,684	1,105
California	714	215	0	929	3,015
Colorado	1,183	0	0	1,183	2,915
Florida	0	810	0	810	0
Georgia	1,249	100	0	1,349	2,025
Idaho	1,000	0	0	1,000	2,120
Illinois	403	0	0	403	12,480
Indiana	2,000	0	0	2,000	7,590
Iowa	25,000	962	0	25,962	57,760
Kansas	5,000	0	0	5,000	11,200
Kentucky	470	0	0	470	405
Louisiana	0	0	4,413	4,413 [c]	0
Maine	0	0	0	0	3,358
Maryland	450	0	0	450	900
Michigan	13,000	0	0	13,000	26,130
Minnesota	11,799	3,134	0	14,933	77,000
Missouri	2,000	0	0	2,000	5,775
Montana	1,076	0	0	1,076	2,310
Nebraska	23,000	0	0	23,000	22,800
New Jersey	0	0	0	0	315
New York	8,500	2,000	0	10,500	17,170
North Carolina	961	3	0	964	2,604
North Dakota	22,000	684	0	22,684	44,520
Ohio	12,000	225	0	12,225	26,350
Oklahoma	1,000	0	0	1,000	2,795
Oregon	4,500	0	0	4,500	9,200
Pennsylvania	10,000	1,087	0	11,087	21,000
South Carolina	700	310	0	1,010	1,596
South Dakota	40,000	0	0	40,000	79,520
Tennessee	0	232	0	232	0
Texas	3,233	1,530	0	4,763	15,000
Utah	262	0	0	262	897
Virginia	0	0	0	0	658
Washington	1,000	0	0	1,000	2,145
West Virginia	0	0	0	0	488
Wisconsin	1,000	0	0	1,000	51,480
Wyoming	9	0	0	9	2,025
Total volume	197,285	11,460	4,413	213,158	518,626
Percent of total volume	92.6	5.4	2.0	100.0	
Percent of total production	38.0	2.2	0.8	41.0	

[a] Excludes shipments to port areas.

[b] Truck shipments may be incomplete because all firms not enumerated.

[c] includes imports from other countries.

Interstate Receipts

Receipts of oats from other states reflected movements to deficit feeding areas, transshipment centers and export points. Interstate receipts represented 23.5 percent of total production in 1985. Since secondary sources indicate that 35 to 40 percent of oats produced were sold from farms, interstate truck shipments may have been under-reported in the survey. Further evidence for this conclusion rests within the oats balance table. The oats reconciliation analysis could not eliminate many of the oats surpluses and deficits for some states. However, truck receipts increased between 1977 and 1985; the 1985 share of oats received by truck increased; and total receipts for the two periods were quite similar.

In the 1985 survey, export locations did not report receiving oats and no state reported shipping oats to an export port. Therefore, receipts at ports by mode were not available for this bulletin. Data for all receipts at ports included in Table 4 were derived from a secondary source, Hoffman and Livezey (1987). Hoffman and Livezey (1987) reported that export locations received only .2 percent of the 121.7 million bushels of interstate receipts in 1985 (Table 4).

The largest interstate receipts were reported for Pennsylvania, Minnesota, Iowa, Missouri, Wisconsin, Texas, Colorado, and Nebraska. With the exception of Colorado and Missouri, all of these states produced relatively large quantities of oats, suggesting that the survey recorded truck shipments for the transshipment centers but may not have recorded data about some receipts at deficit feed areas.

The distribution of interstate receipts among the three modes of transportation was relatively unequal. Nearly 58 percent of the reported receipts moved by truck, 27 percent by rail, and 15 percent by barge. If more truck receipts had been identified in the survey, the distribution of interstate receipts would have been more skewed in favor of the truck mode. The origins of receipts are presented in the Appendix tables in this report.

Interstate Shipments

Interstate shipments must match interstate receipts in total (Tables 4 and 5). Whatever is shipped from one location must be received at another. With the exception of oats movements to the two port areas, all discrepancies that may have appeared between total interstate receipts and interstate shipments were eliminated during the reconciliation process. The distribution of interstate shipments among the three modes of transportation was the same as for interstate receipts discussed previously.

The states shipping the largest volumes were Minnesota, South Dakota, Louisiana, and North Dakota. Three other states, Iowa, Nebraska, and Ohio, reportedly shipped medium volumes to interstate destinations. Except for Louisiana, which did not report producing oats in 1985, these states were large oats producers (Table 3). Barge shipments originating in Louisiana became imports through Gulf ports. The destinations of shipments by states are presented in the Appendices to this report.

Exports and Imports

For reporting purposes, data for individual export and import ports were summarized into 13 port areas for five regions (Table 6). Total volume exported was 209 thousand bushels in 1985 (Table 7). Origins of exports by state and shipment by mode are unknown. Equal amounts of oats were received for export at the Louisiana Gulf and Direct Export points into Mexico.

The United States was a net oat importer in 1985, with 28 million bushels of oats imported [Agricultural Statistics, 1987]. Most of the oat

Table 4.

1985 Interstate Receipts of Oats for Each State by Mode of Transport.[a]

Destination State	Mode of Transportation			
	Truck[b]	Rail	Barge	Total
	thousands of bushels			
Alabama	11	209	3,577	3,797
Arizona	0	1,280	0	1,280
Arkansas	1,136	0	210	1,346
California	2,193	1,062	0	3,255
Colorado	5,441	0	0	5,441
Delaware	323	0	0	323
Florida	2,250	637	278	3,165
Georgia	807	720	0	1,527
Idaho	3	0	0	3
Illinois	4,000	531	403	4,934
Indiana	3,000	368	0	3,368
Iowa	8,580	1,212	0	9,792
Kentucky	203	633	680	1,516
Louisiana	26	0	0	26
Maryland	363	2,016	0	2,379
Michigan	500	0	0	500
Minnesota	2,840	9,617	0	12,457
Mississippi	0	25	3,217	3,242
Missouri	7,000	1,369	302	8,671
Montana	3,400	0	0	3,400
Nebraska	5,000	0	0	5,000
New Jersey	485	445	0	930
New York	640	2,032	0	2,672
North Carolina	2,994	799	0	3,793
North Dakota	507	0	0	507
Ohio	309	1,101	2,255	3,665
Oklahoma	0	1,158	1,384	2,542
Pennsylvania	7,090	3,975	2,302	13,367
South Carolina	288	253	0	541
Tennessee	35	678	1,979	2,692
Texas	4,124	857	1,651	6,632
Utah	307	189	0	496
Virginia	0	278	0	278
Washington	300	242	0	542
West Virginia	0	202	0	202
Wisconsin	5,856	1,293	0	7,149
Wyoming	54	0	0	54
Louisiana Gulf Ports[c]	0	0	0	101
Direct Exports[d]	0	0	0	109
Total volume[e]	70,065	33,181	18,238	121,694[f]
Percent of total receipts[g]	57.7	27.3	15.0	100.0

[a] Does not include port area receipts.

[b] Truck shipments could be under reported.

[c] From secondary source, modal split unknown [Hoffman and Livezey, 1987].

[d] From secondary source, modal split unknown: interior shipments to Mexico [Hoffman and Livezey, 1987].

[e] The sum of the truck, rail, and barge total volume does not equal total volume because modal split for exports is unknown.

[f] Total receipts are greater than total shipments because origination of exports by state is unknown.

[g] The percentages will not add to 100 percent because exports by mode to port are unknown.

Table 5.

1985 Interstate Shipments of Oats for Each State by Mode of Transport.[a]

Origin State	Mode of Transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	1,135	551	0	1,686
Arkansas	51	0	0	51
California	0	242	0	242
Georgia	3,200	225	0	3,425
Idaho	1,035	340	0	1,375
Illinois	4,324	438	0	4,762
Indiana	151	3	0	154
Iowa	6,660	2,842	80	9,582
Kansas	958	202	0	1,160
Kentucky	0	465	0	465
Louisiana	0	0	16,027	16,027 [b]
Maryland	2,500	0	0	2,500
Michigan	277	1,125	0	1,402
Minnesota	15,600	5,002	2,037	22,639
Mississippi	2,154	195	0	2,349
Missouri	1,000	0	0	1,000
Montana	76	0	0	76
Nebraska	5,302	1,876	0	7,178
New York	2,870	385	0	3,255
North Carolina	288	51	0	339
North Dakota	6,561	4,710	0	11,271
Ohio	3,067	2,123	0	5,190
Oregon	1,039	408	0	1,447
Pennsylvania	1,327	2,828	0	4,155
South Carolina	377	270	0	647
South Dakota	9,963	7,624	0	17,587
Tennessee	126	658	0	784
Texas	0	430	0	430
Utah	3	0	0	3
Wisconsin	21	188	94	303
Total volume	70,065	33,181	18,238	121,484 [c]
Percent of total receipts	57.7	27.3	15.0	100.00

[a] Includes shipments to port areas.

[b] Includes supply imported from other countries.

[c] Total receipts are greater than total shipments because origination of exports by state is unknown.

Table 6.
Export and Import Regions, Port Areas, and Port Cities.

Port Region	Port Area	Port City
Great Lakes Region	Duluth-Superior	Duluth, MN Superior, WI
	Chicago	Milwaukee, WI Manitowoc, WI Racine, WI Chicago, IL
	Toledo	Toledo, OH Huron, OH Erie, PA Buffalo, NY
	Saginaw	Carrollton, MI Saginaw, Mi Zilwaukee, MI Detroit, MI
Atlantic Region	North Atlantic	Portland, ME Albany, NY Philadelphia, PA
	South Atlantic	Baltimore, MD Norfolk, VA North Charleston, SC
Gulf Region	East Gulf	Pascagoula, MS Mobile, AL
	Louisiana Gulf	Mississippi River Lake Charles, LA
	North Texas Gulf	Beaumont, TX Port Arthur, TX Houston, TX Galveston, TX
	South Texas Gulf	Brownsville, TX Corpus Christi, TX
Pacific Region	Columbia River	Kalama, WA Longview, WA Vancouver; WA Portland, OR Astoria, OR
	Puget Sound	Seattle, WA Tacoma, WA
	California Ports	Sacramento, CA Stockton, CA Long Beach, CA San Francisco, CA San Diego, CA
Direct[a]		

[a] Exports that originate in the interior U.S. bound for Mexico or Canada.

Table 7.
Exports and Imports of Oats by Port for 1985 and 1977.

Port region and port area[a]	1985 Import	1985 Export	1977 Import	1977 Export
		thousands of bushels		
Great Lakes Region				
Chicago	0	0	0	1,003
Duluth-Superior	0	0	0	10,961
Subtotal	0	0	0	11,964
Atlantic Region				
North Atlantic	0	0	0	0
South Atlantic	0	0	0	0
Subtotal	0	0	0	0
Gulf Region				
Eastern Gulf	0	0	0	275
Louisiana Gulf	16,027	101[b]	0	5,156
Subtotal	16,027	101	0	5,431
Pacific Region				
California Ports	0	0	0	2,867
Pacific Northwest	0	0	0	0
Puget Sound	0	0	0	212
Subtotal	0	0	0	3,079
Direct Exports	0	109[b]	0	0
Total	28,000[c]	209	2,000[c]	12,000
Percentage of total receipts	10.3	18.5	71.2	100.00

[a] See Table 6 for definition of regions and port areas.

[b] Source: Hoffman and Livezey.

[c] Allocation of the balance among ports is unknown.

imports originated in Canada and northern Europe, principally Sweden and Finland [Hoffman and Livezey, 1987]. Most of the imports (16 million bushels) moved through the Louisiana Gulf ports (Table 7). The largest volumes were shipped by barge up the river from the Louisiana Gulf Ports to feeders and food processors in Alabama, Mississippi, Pennsylvania, Ohio, Texas, Tennessee, and Oklahoma (Appendix Table 15).

Comparisons with 1977

Production and Utilization

Changes in supplies and distribution during the period from 1977 to 1985 indicated long term trends as well as changes in economic variables. Oats production decreased 31 percent, from 753 million bushels in 1977 to 521 million in 1985 (Table 1). However, total supply decreased by only 21 percent because of the increase in imports.

The decrease in production during the period reflected the decline in acreage, and possibly the effects of the food and feed grain policies. Total disappearance declined by 10 percent and exports declined by 84 percent, with feed exports being reduced by nearly 10 percent and seed by 7 percent. Use of oats for food increased by nearly 5 percent during the period. The fact that the volume of oats used in food processing increased as compared to the volume used for feed and export had implications for the oats transportation and distribution systems because a higher percent-

Table 8.
Oats Production by Regions of United States for 1985 and 1977.

Region	Oats Production		Percent of U.S. Production	
	1985	1977	1985	1977
	millions of bushels			
Northeast	43.3	37.0	8.3	4.9
Lake States	154.6	256.6	29.8	34.2
Cornbelt	110.0	143.1	21.2	19.1
Northern Plains	158.0	242.4	30.5	32.3
Southern Plains	17.8	30.0	3.4	4.0
Appalachia	4.0	6.5	1.0	1.0
Southeast	5.0	6.8	1.0	1.0
Delta	1.1	4.5	[a]	[a]
Mountain	10.3	12.1	2.0	1.6
Pacific	14.3	12.0	2.8	1.6
Total[b]	518.6	750.9	100.0	100.0

[a] Less than one percent.

[b] Total may not sum due to rounding.

Source: *Agricultural Statistics*, U.S.D.A., 1986 and 1979.

Table 9.

Interstate Shipments of Oats to Domestic Destinations and Exports for Each Region[a] and Mode of Transport, 1985, and Total 1977 Shipments by Region, United States.

Regions	1985 Truck	1985 Rail	1985 Barge	1985 Total	1977[b] Total[c]
	millions of bushels				
Northeast	6.7	3.2	0	9.9	0.4
Lake States	15.9	6.3	2.1	24.3	45.6
Corn Belt	15.2	5.4	[d]	20.7	21.9
Northern Plains	22.8	14.4	0	37.2	38.2
Southern Plains	0	0.4	0	0.4	[d]
Appalachia	0.4	1.2	0	1.6	1.7
Southeast	4.7	1.0	0	5.8	2.5
Delta	2.2	0.2	16.0	18.4	4.4
Mountain	1.1	0.3	0	1.4	2.1
Pacific	1.0	0.6	0	1.7	8.5
Total[c]	70.1	33.2	18.2	121.5	125.4
Percentage of total shipments (1985)	57.7	27.3	15.0	100.0	
1977 total shipments	47.2	61.9	16.4		
Percentage of total receipts (1977)	37.6	49.4	13.0		

[a] States included in each region are identified in Figure 2.

[b] Leath, Mack N., Lowell D. Hill and Stephen W. Fuller, *"Oat Movements in the United States"*, NCRR Bulletin 276, SCS Bulletin 257, University of Illinois, Urbana/Champaign, Illinois, January 1981.

[c] Totals may not sum due to rounding process.

[d] Less than 100,000 bushels.

age of oats was used off farms. If the United States remains a net importer, oats may be transported long distances up the rivers from the port areas to domestic food and feed processing centers.

The share of total production increased slightly from 1977 to 1985 for the Northeast, Corn Belt, Mountain and Pacific regions (Table 8). The increase in total production and production share for the Northeast may reflect the importance of oats in the ration for dairy cattle. The decline in total production for most regions probably resulted from the change in net returns for oats as compared to other crops. Incentives from government food and feed programs created an additional disadvantage for the production of oats.

Interstate Shipments

The Northern plains replaced the Lake States as the largest shipper of oats while the share shipped by the Lake States declined (Table 9). The Northeast and Delta regions also increased their shares of total shipments. These increases were linked to both the increase in imports and the change in regional production that occurred since 1977. However, these observed changes must be interpreted cautiously. If truck shipments in 1985 were under-reported for some states, the rankings among states and by mode of transportation may be misleading.

Total 1985 shipments for all modes decreased by only three percent from the 1977 level (Table 10). This modest decline occurred

Table 10.
Total Volume of Interstate Oats Shipments by Mode of Transport, 1977 vs. 1985.[a]

Mode	1977[b]		1985		Percent change
	Volume	Percent share	Volume	Percent share	
	thousands of bushels		*thousands of bushels*		
Truck	47,156	37.6	70,065	57.7	48.6
Rail	61,899	49.4	33,181	27.3	–46.4
Barge	16,378	13.0	18,238	15.0	11.4
Total	125,433	100.0	121,484	100.0	–3.1

[a] Shipments to port areas are included.

[b] Derived from *"Oat Movements in the United States, Interregional Flow Patterns and Transportation Requirements in 1977"*, by Mack N. Leath, Lowell D. Hill, and Stephen W. Fuller, p. 13.

Table 11.
Interstate Receipts of Oats by Region and Mode of Transport, 1985, and Total 1977 Shipments by Region, United States.[a]

Regions	1985				1977[b]
	Truck	Rail	Barge	Total	Total[c]
	millions of bushels				
Northeast	8.9	8.5	2.3	19.7	18.8
Lake States	9.2	10.9	0	20.1	28.8
Corn Belt	22.9	4.6	3.0	30.4	15.6
Northern Plains	5.5	0	0	5.5	0.9
Southern Plains	4.1	2.0	3.0	9.2	9.1
Appalachia	3.2	2.6	2.6	8.5	12.2
Southeast	3.4	1.8	3.8	9.0	6.7
Delta	1.1	[d]	3.4	4.6	10.1
Mountain	9.2	1.4	0	10.7	0.7
Pacific	2.5	1.3	0	3.8	7.6
Total[c]	70.1	33.2	18.2	121.5	110.5[e]
Percentage of total receipts (1985)	57.7	27.3	15.0	100.0	
1977 total receipts	45.5[c]	52.3	12.8		
Percentage of total receipts (1977)	36.7[c]	47.3	11.6		

[a] States included in each region are identified in Figure 2.

[b] Leath, Mack N., Lowell D. Hill and Stephen W. Fuller, *"Oat Movements in the United States"*, NCRR Bulletin 276, SCS Bulletin 257, University of Illinois, Urbana/Champaign, Illinois, January 1981.

[c] Totals may not sum due to rounding process.

[d] Less than 100,000 bushels.

[e] Domestic receipts in 1985 are higher than receipts for 1977 because exports declined significantly.

even though U.S. oat production decreased by 31 percent during the same period. Shipments decreased only modestly because a higher percentage of the oats production was marketed from farms and the United States became a net oats importer.

Another surprising finding was that the volume and share of oats trucked among interstate origins and destinations increased significantly between 1977 and 1985 (Table 10). Truck shipments increased to nearly 58 percent of the total oats shipped, a 48.6 percent increase over the 1977 level. Both the volume of oats shipped by rail and the share shipped by rail declined. Barge shipments remained nearly constant, increasing by almost two million bushels. In 1977, most of the barge shipments were to export markets, while in 1985, most barge shipments were transporting U.S. oats imports into interior U.S. food and feed processing centers. The growth in truck and barge shipments may be linked to the change in production patterns for the regions, the increase in demand for oats as a food product rather than a feed product, and the United States' change to a net importing status. Structural changes in transportation and deregulation may also have contributed to these changes in shares.

Interstate Receipts

Total interstate receipts of oats increased modestly from 110.5 million in 1977 to 121.5 million in 1985, an increase of nearly 10 percent (Table 11). The Corn Belt replaced the Lake States as the most important oats-receiving region in 1985. Oats receipts into the Corn Belt nearly doubled. Other regions, Northeast, Northern Plains, Southern Plains, Southeast and Mountain, also increased receipts of oats during this period. Interstate oats receipts in the Lake States, Appalachia, Delta and Pacific regions declined from the 1977 levels. These relationships may reflect some under-reporting of truck receipts for some regions, a decrease in feed demand and exports, and increases in food demand and imports.

Total interstate receipts of oats by mode of transportation show that truck accounted for 58 percent of all receipts, rail for 27 percent, and barge for 15 percent. The share of truck and barge receipts increased from 1977 to 1985, while the share for rail receipts decreased.

Conclusions

Results from the 1985 oats flow study revealed several important changes when compared with the results of the 1977 study. Oats production decreased for the United States. However, production patterns continued to show a concentration of production in three regions: Lakes States, Corn Belt, and Northern Plains. While oats production decreased for nearly all regions, production increased in the Northeast and Pacific regions.

Feed and seed demand decreased, while the demand for oats as a food product increased. The United States also changed from a net exporter of oats in 1977 to a net importer in 1985. Most of the imports arrived in the Louisiana Gulf port and were shipped by barge to interior food and feed processing centers.

Truck shipments became the dominant mode used in interstate transportation of oats, accounting for nearly 58 percent of all movements in 1985 as compared to 37 percent in 1977. Barge shipments increased from 13 to 15 percent of the total, while rail shipments decreased from 49 to 27 percent in the same period. Transportation deregulation does not appear to have helped the railroads compete for interstate oats shipments. Strong competition among modes of transportation, an increase in food demand, a decrease in feed and seed demand, and the United States' change to net oats importing status in 1985 may explain the observed changes in modal shares.

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Appendix

Receipts and Shipments of Oats by State, 1985.

Table 12. Alabama

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Illinois	0	3	0	3
Indiana	11	3	0	14
Louisiana	0	0	2,943	2,943
Minnesota	0	0	540	540
South Carolina	0	203	0	203
Wisconsin	0	0	94	94
Total interstate	11	209	3,577	3,797

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Florida	650	202	0	852
Georgia	456	0	0	456
Mississippi	0	25	0	25
North Carolina	0	97	0	97
South Carolina	0	202	0	202
Tennessee	29	25	0	54
Total interstate	1,135	551	0	1,686
Intrastate	266	168	0	434
Total	1,401	719	0	2,120

Table 13. Arizona

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Idaho	0	340	0	340
Nebraska	0	180	0	180
North Dakota	0	760	0	760
Total interstate	0	1,280	0	1,280

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Intrastate	826	0	0	826

Table 14. Arkansas

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Iowa	136	0	0	136
Louisiana	0	0	210	210
Missouri	1,000	0	0	1,000
Total interstate	1,136	0	210	1,346

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Texas	51	0	0	51
Total interstate	51	0	0	51
Intrastate	2,684	0	0	2,684
Total	2,735	0	0	2,735

Table 15. California

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Kansas	517	202	0	719
Nebraska	0	202	0	202
North Dakota	637	250	0	887
Oregon	1,039	408	0	1,447
Total interstate	2,193	1,062	0	3,255

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Washington	0	242	0	242
Total interstate	0	242	0	242
Intrastate	714	215	0	929
Total	714	457	0	1,171

Table 16. Colorado

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Kansas	441	0	0	441
Nebraska	5,000	0	0	5,000
Total interstate	5,441	0	0	5,441

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Total interstate	0	0	0	0
Intrastate	1,183	0	0	1,183
Total	1,183	0	0	1,183

Table 17. Delaware

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Pennsylvania	323	0	0	323
Total interstate	323	0	0	323

Table 18. Florida

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	650	202	0	852
Georgia	1,600	225	0	1,825
Georgia	0	210	0	210
Louisiana	0	0	278	278
Total interstate	2,250	637	278	3,165

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Total interstate	0	0	0	0
Intrastate	0	810	0	810
Total	0	810	0	810

Table 19. Georgia

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	456	0	0	456
Kentucky	0	50	0	50
Michigan	0	70	0	70
Mississippi	225	150	0	375
Tennessee	126	450	0	576
Total interstate	807	720	0	1,527

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Florida	1,600	225	0	1,825
North Carolina	1,600	0	0	1,600
Total interstate	3,200	225	0	3,425
Intrastate	1,249	100	0	1,349
Total	4,449	325	0	4,774

Table 20. Idaho

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Utah	3	0	0	3
Total interstate	3	0	0	3

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Arizona	0	340	0	340
Montana	700	0	0	700
Utah	35	0	0	35
Washington	300	0	0	300
Total interstate	1,035	340	0	1,375
Intrastate	1,000	0	0	1,000
Total	2,035	340	0	2,375

Table 21. Illinois

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Iowa	500	0	0	500
Louisiana	0	0	403	403
Minnesota	3,500	531	0	4,031
Total interstate	4,000	531	403	4,934

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	0	3	0	3
Florida	0	210	0	210
Indiana	2,500	0	0	2,500
Iowa	300	0	0	300
Michigan	500	0	0	500
Missouri	1,000	0	0	1,000
Ohio	0	225	0	225
Texas	24	0	0	24
Total interstate	4,324	438	0	4,762
Intrastate	403	0	0	403
Total	4,727	438	0	5,165

Table 22. Indiana

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Illinois	2,500	0	0	2,500
Ohio	500	368	0	868
Total interstate	3,000	368	0	3,368

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	11	3	0	14
Ohio	140	0	0	140
Total interstate	151	3	0	154
Intrastate	2,000	0	0	2,000
Total	2,151	3	0	2,154

Table 23. Iowa

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Illinois	300	0	0	300
Minnesota	5,280	516	0	5,796
North Dakota	3,000	0	0	3,000
South Dakota	0	696	0	696
Total interstate	8,580	1,212	0	9,792

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Arkansas	136	0	0	136
Illinois	500	0	0	500
Maryland	0	1,681	0	1,681
Missouri	6,000	477	0	6,477
Oklahoma	0	540	0	540
Tennessee	0	0	80	80
Texas	24	144	0	168
Total interstate	6,660	2,842	80	9,582
Intrastate	25,000	962	0	25,962
Total	31,660	3,804	80	35,544

Table 24. Kansas

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
California	517	202	0	719
Colorado	414	0	0	414
Total interstate	958	202	0	1,160
Intrastate	5,000	0	0	5,000
Total	5,958	202	0	6,160

Table 25. Kentucky

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Louisiana	0	0	680	680
Michigan	203	0	0	203
Ohio	0	633	0	633
Total interstate	203	633	680	1,516

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Georgia	0	50	0	50
Tennessee	0	415	0	415
Total interstate	0	465	0	465
Intrastate	470	0	0	470
Total	470	465	0	935

Table 26. Louisiana

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Mississippi	26	0	0	26
Total interstate	26	0	0	26

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Mississippi	0	0	2,943	2,943
Arkansas	0	0	210	210
Florida	0	0	278	278
Illinois	0	0	403	403
Kentucky	0	0	680	680
Mississippi	0	0	2,447	2,447
Missouri	0	0	96	96
Ohio	0	0	2,255	2,255
Oklahoma	0	0	1,301	1,301
Pennsylvania	0	0	2,302	2,302
Tennessee	0	0	1,461	1,461
Texas	0	0	1,651	1,651
Total interstate	0	0	16,027	16,027
Intrastate	0	0	4,413	4,413
Total	0	0	20,440	20,440

Table 27. Maryland

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Iowa	0	1,681	0	1,681
Michigan	0	225	0	225
Pennsylvania	363	110	0	473
Total interstate	363	2,016	0	2,379

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
North Carolina	1,000	0	0	1,000
Pennsylvania	1,500	0	0	1,500
Total interstate	2,500	0	0	2,500
Intrastate	450	0	0	450
Total	2,950	0	0	2,950

Table 28. Michigan

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Illinois	500	0	0	500
Total interstate	500	0	0	500

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Georgia	0	70	0	70
Kentucky	203	0	0	203
Maryland	0	225	0	225
New York	0	180	0	180
Ohio	74	448	0	522
West Virginia	0	202	0	202
Total interstate	277	1,125	0	1,402
Intrastate	13,000	0	0	13,000
Total	13,277	1,125	0	14,402

Table 29. Minnesota

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
North Dakota	1,009	3,418	0	4,427
South Dakota	1,831	6,199	0	8,030
Total interstate	2,840	9,617	0	12,457

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	0	0	540	540
Illinois	3,500	531	0	4,031
Iowa	5,280	516	0	5,796
Mississippi	0	0	770	770
Missouri	0	0	206	206
North Dakota	507	0	0	507
Oklahoma	0	0	83	83
Pennsylvania	432	3,230	0	3,662
Tennessee	0	0	438	438
Utah	25	189	0	214
Wisconsin	5,856	536	0	6,392
Total interstate	15,600	5,002	2,037	22,639
Intrastate	11,799	3,134	0	14,933
Total	27,399	8,136	2,037	37,572

Table 30. Mississippi

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	0	25	0	25
Louisiana	0	0	2,447	2,447
Minnesota	0	0	770	770
Total interstate	0	25	3,217	3,242

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Georgia	225	150	0	375
Louisiana	26	0	0	26
Texas	1,903	45	0	1,948
Total interstate	2,154	195	0	2,349
Intrastate	0	0	0	0
Total	2,154	195	0	2,349

Table 31. Missouri

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Illinois	1,000	0	0	1,000
Iowa	6,000	477	0	6,477
Louisiana	0	0	96	96
Minnesota	0	0	206	206
Nebraska	0	892	0	892
Total interstate	7,000	1,369	302	8,671

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Arkansas	1,000	0	0	1,000
Total interstate	1,000	0	0	1,000
Intrastate	2,000	0	0	2,000
Total	3,000	0	0	3,000

Table 32. Montana

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Idaho	700	0	0	700
North Dakota	1,200	0	0	1,200
South Dakota	1,500	0	0	1,500
Total interstate	3,400	0	0	3,400

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Utah	22	0	0	22
Wyoming	54	0	0	54
Total interstate	76	0	0	76
Intrastate	1,000	0	0	1,000
Total	1,076	0	0	1,076

Table 33. Nebraska

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
South Dakota	5,000	0	0	5,000
Total interstate	5,000	0	0	5,000

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Arizona	0	180	0	180
California	0	202	0	202
Colorado	5,000	0	0	5,000
Missouri	0	892	0	892
Oklahoma	0	188	0	188
Texas	299	414	0	713
Utah	3	0	0	3
Total interstate	5,302	1,876	0	7,178
Intrastate	23,000	0	0	23,000
Total	28,302	1,876	0	30,178

Table 34. New Jersey

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Pennsylvania	485	445	0	930
Total interstate	485	445	0	930

Table 35. New York

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Michigan	0	180	0	180
Ohio	500	237	0	737
Pennsylvania	140	1,615	0	1,755
Total interstate	640	2,032	0	2,672

Oats Shipments to Various Destinations

Destination	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Ohio	79	0	0	79
Pennsylvania	2,791	385	0	3,176
Total interstate	2,870	385	0	3,255
Intrastate	8,500	2,000	0	10,500
Total	11,370	2,385	0	13,755

Table 36. North Carolina

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Alabama	0	97	0	97
Georgia	1,600	0	0	1,600
Maryland	1,000	0	0	1,000
Ohio	17	237	0	254
Pennsylvania	0	190	0	190
South Carolina	377	67	0	444
Tennessee	0	208	0	208
Total interstate	2,994	799	0	3,793

Oats Shipments to Various Destinations

Destination	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
South Carolina	288	51	0	339
Total interstate	288	51	0	339
Intrastate	961	3	0	964
Total	1,249	54	0	1,303

Table 37. North Dakota

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Minnesota	507	0	0	507
Total interstate	507	0	0	507

Oats Shipments to Various Destinations

Destination	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Arizona	0	760	0	760
California	637	250	0	887
Iowa	3,000	0	0	3,000
Minnesota	1,009	3,418	0	4,427
Montana	1,200	0	0	1,200
Pennsylvania	323	0	0	323
Texas	303	0	0	303
Utah	89	0	0	89
Wisconsin	0	282	0	282
Total interstate	6,561	4,710	0	11,271
Intrastate	22,000	684	0	22,684
Total	28,561	5,394	0	33,955

Table 38. Ohio

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Illinois	0	225	0	225
Indiana	140	0	0	140
Louisiana	0	0	2,255	2,255
Michigan	74	448	0	522
New York	79	0	0	79
Pennsylvania	16	240	0	256
Wisconsin	0	188	0	188
Total interstate	309	1,101	2,255	3,665

Oats Shipments to Various Destinations

Destination	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Indiana	500	368	0	868
Kentucky	0	633	0	633
New York	500	237	0	737
North Carolina	17	237	0	254
Pennsylvania	2,044	360	0	2,404
Tennessee	6	238	0	244
Virginia	0	50	0	50
Total interstate	3,067	2,123	0	5,190
Intrastate	12,000	225	0	12,225
Total	15,067	2,348	0	17,415

Table 39. Oklahoma

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Iowa	0	540	0	540
Louisiana	0	0	1,301	1,301
Minnesota	0	0	83	83
Nebraska	0	188	0	188
Texas	0	430	0	430
Total interstate	0	1,158	1,384	2,542

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Total interstate	0	0	0	0
Intrastate	1,000	0	0	1,000
Total	1,000	0	0	1,000

Table 40. Oregon

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
California	1,039	408	0	1,447
Total interstate	1,039	408	0	1,447
Intrastate	4,500	8	0	4,500
Total	5,539	816	0	5,947

Table 41. Pennsylvania

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Louisiana	0	0	2,302	2,302
Maryland	1,500	0	0	1,500
Minnesota	432	3,230	0	3,662
New York	2,791	385	0	3,176
North Dakota	323	0	0	323
Ohio	2,044	360	0	2,404
Total interstate	7,090	3,975	2,302	13,367

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Delaware	323	0	0	323
Maryland	363	110	0	473
New Jersey	485	445	0	930
New York	140	1,615	0	1,755
North Carolina	0	190	0	190
Ohio	16	240	0	256
Virginia	0	228	0	228
Total interstate	1,327	2,828	0	4,155
Intrastate	10,000	1,087	0	11,087
Total	11,327	3,915	0	15,242

Table 42. South Carolina

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	0	202	0	202
North Carolina	288	51	0	339
Total interstate	288	253	0	541

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	0	203	0	203
North Carolina	377	67	0	444
Total interstate	377	270	0	647
Intrastate	700	310	0	1,010
Total	1,077	580	0	1,657

Table 43. South Dakota

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Iowa	0	696	0	696
Minnesota	1,831	6,199	0	8,030
Montana	1,500	0	0	1,500
Nebraska	5,000	0	0	5,000
Texas	1,520	242	0	1,774
Utah	112	0	0	112
Wisconsin	0	475	0	475
Total interstate	9,963	7,624	0	17,587
Intrastate	40,000	0	0	40,000
Total	49,963	7,624	0	57,587

Table 44. Tennessee

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Alabama	29	25	0	54
Iowa	0	0	80	80
Kentucky	0	415	0	415
Louisiana	0	0	1,461	1,461
Minnesota	0	0	438	438
Ohio	6	238	0	244
Total interstate	35	678	1,979	2,692

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Georgia	126	450	0	576
North Carolina	0	208	0	208
Total interstate	126	658	0	784
Intrastate	0	232	0	232
Total	126	890	0	1,016

Table 45. Texas

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Arkansas	51	0	0	51
Illinois	24	0	0	24
Iowa	24	144	0	168
Louisiana	0	0	1,651	1,651
Mississippi	1,903	45	0	1,948
Nebraska	299	414	0	713
North Dakota	303	0	0	303
South Dakota	1,520	254	0	1,174
Total interstate	4,124	857	1,651	6,632

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Oklahoma	0	430	0	430
Total interstate	0	430	0	430
Intrastate	3,233	1,530	0	4,763
Total	3,233	1,960	0	5,193

Table 46. Utah

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Idaho	35	0	0	35
Minnesota	25	189	0	214
Montana	22	0	0	22
Nebraska	3	0	0	3
North Dakota	89	0	0	89
South Dakota	112	0	0	112
Wisconsin	21	0	0	21
Total interstate	307	189	0	496

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Idaho	3	0	0	3
Total interstate	3	0	0	3
Intrastate	262	0	0	262
Total	265	0	0	265

Table 47. Virginia

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Ohio	0	50	0	50
Pennsylvania	0	228	0	228
Total interstate	0	278	0	278

Table 48. Washington

Oats Receipts from Various Origins

Origin	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
California	0	242	0	242
Idaho	300	0	0	300
Total interstate	300	242	0	542

Oats Shipments to Various Destinations

Destination	Mode of transportation			Total
	Truck	Rail	Barge	
	thousands of bushels			
Total interstate	0	0	0	0
Intrastate	1,000	0	0	1,000
Total	1,000	0	0	1,000

Table 49. West Virginia

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Michigan	0	202	0	202
Total interstate	0	202	0	202

Table 50. Wisconsin

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Minnesota	5,856	536	0	6,392
North Dakota	0	282	0	282
South Dakota	0	475	0	475
Total interstate	5,856	1,293	0	7,149

Oats Shipments to Various Destinations

Destination	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Alabama	0	0	94	94
Ohio	0	188	0	188
Utah	21	0	0	21
Total interstate	21	188	94	303
Intrastate	1,000	0	0	1,000
Total	1,021	188	94	1,303

Table 51. Wyoming

Oats Receipts from Various Origins

Origin	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Montana	54	0	0	54
Total interstate	54	0	0	54

Oats Shipments to Various Destinations

Destination	Mode of transportation: Truck	Rail	Barge	Total
	thousands of bushels			
Total interstate	0	0	0	0
Intrastate	9	0	0	9
Total	9	0	0	9